

## **REMARKS**

### **I. Status of the Application**

Claims 1-55 were presented in this application. Claims 4-15, 18, 25-26, 31, 45-47 have been withdrawn as directed to non-elected species. Thus the pending claims are 1-3, 16-17, 19-24, 27-30, 32-44, and 48-55. These pending claims have received a final rejection.

Applicant gratefully acknowledges the withdrawal of the objection to the specification, the 35 U.S.C. § 102(a) rejection over Richards et al. “Optimisation of a Neural Network Model for Calibration of Voltammetric Data,” *Chemometrics and Intelligent Laboratory Systems*, 61, 2002, p. 35-49 (hereinafter “Richards”), and the obviousness-type double patenting rejection over U.S. application No. 10/621,079.

Claims 1-3, 16, 17, 19-24 and 53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Richards in view of US 6,331,244 to Lewis et al. (hereinafter “Lewis”). For the reasons set forth below, this rejection is respectfully traversed.

Claims 27-44, 48, 49, 54 and 55 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Richards in view of Lewis and further in view of Applicant’s admission of prior art. For the reasons set forth below, this rejection is respectfully traversed.

Claims 50-52 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Richards in view of Lewis and Applicant’s admission of prior art and further in view of Schneider “Cross Validation,” February 1997, <http://www.cs.cmu.edu/~schneide/tut5/node42.html>. For the reasons set forth below, this rejection is respectfully traversed.

Applicant respectfully requests reconsideration of the application in view of the following remarks, which are intended to place this case in condition for allowance.

**II. Claims 1-3, 16, 17, 19-24 and 53 are Not Obvious over Richards in view of Lewis**

At page 2, paragraph 5 of the instant action, claims 1-3, 16, 17, 19-24 and 53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Richards in view of Lewis. Applicant respectfully traverses the rejection as failing to set forth a *prima facie* case of obviousness.

As submitted by Applicant in sections V and VI of the previous Office Action Response (filed June 6, 2006 and incorporated herein by reference), and as the Examiner admits by withdrawing the 35 U.S.C. § 102(a) and 35 U.S.C. § 103(a) rejections over Richards, Richards fails to teach or suggest each and every limitation of independent claims 1 and 53 and dependent claims 2, 3, 16, 17, and 19-24. The subject claims are also not obvious over Richards alone. The Examiner admits that Richards fails to teach calibration of voltammetric data of an electroplating bath. Specifically, Richards fails to teach the electrolyte solution of step (a) in claim 1 and step (a1) in claim 53:

(a)/(a1) providing a multi-component electrolyte solution comprising constituents which possess significantly different electrochemical properties,

said constituents being present in the electrolyte solution at concentrations significantly different from each other,

said constituents interacting electrochemically with each other in the electrolyte solution;

The Examiner relies upon Lewis to teach the use of a neural network to process

data from a voltammographic measurement of complex electroplating solutions. However, Lewis fails to cure the deficiencies of Richards. The Examiner refers to the abstract, Fig. 2, cols. 7-8 and 14 of Lewis for support of complex electroplating solutions such as copper electroplating baths. On the contrary, nowhere does Lewis teach or suggest the use of its chemical sensor in complex electroplating solutions, nor in any solution like the multi-component electrolyte solutions recited in the subject claims. The abstract and cols. 7-8 of Lewis describe a chemical sensor that provides a difference in electrical resistance when contacted with a fluid comprising an analyte at a first concentration, than when contacted with a fluid comprising the analyte at a second concentration. This does not teach or suggest a *multi-component* electrolyte solution having the recited different constituents. Fig. 2 of Lewis shows a voltammogram of a single salt in acetonitrile solution (col. 3, lines 29-32, col. 14, lines 3-5), which is also not a *multi-component* electrolyte solution having the recited different constituents. In fact, Lewis only discloses analytes and fluids that are of similar type and properties, that is, organic compounds and biomolecules (col. 9, lines 13-25). Lewis does not teach metals as possible analytes, much less copper in a copper plating solution. In the Examples, Lewis exposes its chemical sensor to a single organic solvent analyte at a time, not a mixture (col. 15, lines 31-33 and 48-53, Table 5, col. 21, lines 3-9). The only analyte mixture taught by Lewis is a methanol-ethanol mixture, which does not possess significantly different constituents with significantly different properties (col. 17, lines 8-9).

The Examiner further relies upon Richards to render obvious the subject matter of dependent claims 22 and 23, asserting that Richards teaches in Figure 3 the use of a combination of multiple portions of a complete electroanalytical response using multiple independent responses at various concentrations. However, the data shown in Figure 3 of Richards is obtained by using only one electroanalytical technique, namely dual pulse staircase voltammetry (page 36, 2. Experimental). Richards simply teaches a method of

building calibration curves by obtaining multiple electroanalytical responses at various sample concentrations using the same electroanalytical technique (dual pulse staircase voltammetry). Figure 3 shows an analysis of different types of calibration error, still obtained using only one electroanalytical technique. Richards neither teaches, suggests, nor provides motivation to use more than one electroanalytical technique to obtain independent electroanalytical responses, and then to combine one or more portions of the independent electroanalytical responses (obtained using independent and different electroanalytical techniques).

Since Richards uses only one type of electroanalytical response obtained from one electroanalytical technique per sample set, Richards is prone to bias and other disadvantages of the chosen electroanalytical technique. In contrast, the embodiments of the present invention recited in claims 22 and 23 introduce a novel and nonobvious method of information enhancement by simultaneous decomposition of data from various independent electroanalytical responses obtained by using different electroanalytical techniques. This method is called “gluing” of voltammograms and is disclosed at page 44, last paragraph to page 45, first paragraph of the specification and in Table 7. One can obtain information significantly free of bias if one simultaneously uses information obtained from more than one electroanalytical technique on the same sample, for example by combining an optimal region of an AC-voltammogram and an optimal region of a DC-voltammogram. This is not taught or suggested by either Richards or Lewis.

For at least the foregoing reasons, the combination of Richards and Lewis fails to teach or suggest each and every limitation of the subject claims.

In addition, neither Richards nor Lewis provides motivation to combine and modify their teachings to arrive at the claimed chemometric method with any expectation of success. Richards in no way suggests the desirability of using the described neural

network model to calibrate voltammetric data acquired from anything other than mixtures of aliphatic compounds. Richards utilizes as model systems mixtures of components that possess similar electrochemical properties, are present at similar concentrations, and do not interact with each other. Lewis in no way suggests the desirability of using the described chemical sensor to measure the concentration of anything other than organic compounds and biomolecules. Lewis primarily senses the concentrations of single analytes, and at most teaches the sensing of binary mixtures. Neither Richards nor Lewis teach in the art field of electroplating. Nor does either reference suggest that their calibration/sensing methods may be applied to the recited multi-component electrolyte solution, comprising mixtures of components that possess different electrochemical properties, are present at significantly different concentrations, and interact electrochemically with each other, such as an electroplating solution including metal compounds. Thus, one skilled in the art would not be led by Richards and Lewis to modify their teachings to arrive at the claimed chemometric method with any expectation of success.

The combination of Richards and Lewis cannot support a *prima facie* case of obviousness, because neither Richards nor Lewis provides suggestion or motivation to combine and modify the references with a reasonable expectation of success, nor does the combination of Richards and Lewis teach or suggest all the claim limitations. Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. § 103(a) rejection and allowance of claims 1-3, 16, 17, 19-24 and 53.

**III. Claims 27-44, 48, 49, 54 and 55 are Not Obvious over Richards in view of Lewis and further in view of Applicant's admission of prior art**

At page 4, paragraph 6 of the instant action, claims 27-44, 48, 49, 54 and 55 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Richards in view of Lewis

and further in view of Applicant's admission of prior art. Applicant respectfully traverses the rejection as failing to set forth a *prima facie* case of obviousness.

For the reasons submitted by Applicant in section VII of the previous Office Action Response (filed June 6, 2006 and incorporated herein by reference), a *prima facie* case of obviousness over Richards and the admitted references cannot be made against the subject claims. For the same reasons that Lewis fails to remedy the deficiencies of Richards in section II above, Lewis also fails to remedy the deficiencies of Richards and the admitted references in the subject rejection. Neither Richards, Lewis, nor any of the admitted references teach or suggest applying the claimed chemometric method to electrolyte solution (a) in independent claim 27, or to corresponding electrolyte solution (a1) in independent claim 54. Therefore, the references in combination do not teach or suggest each and every element of the subject independent and dependent claims. The references also fail to provide motivation to combine and modify teachings to arrive at the claimed chemometric method with a reasonable expectation of success. Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. § 103(a) rejection and allowance of claims 27-44, 48, 49, 54 and 55.

**IV. Claims 50-52 are Not Obvious over Richards, Lewis, Applicant's admission of prior art, and Schneider**

At page 7, paragraph 7 of the instant action, claims 50-52 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Richards, Lewis, Applicant's admission of prior art, and further in view of Schneider. Applicant respectfully traverses the rejection as failing to set forth a *prima facie* case of obviousness.

For the reasons submitted by Applicant in section VIII of the previous Office Action Response (filed June 6, 2006 and incorporated herein by reference), a *prima facie*

case of obviousness over Richards, the admitted references, and Schneider cannot be made against the subject claims. For the same reasons that Lewis fails to remedy the deficiencies of Richards in section II above, Lewis also fails to remedy the deficiencies of Richards, the admitted references, and Schneider in the subject rejection. Neither Richards, Lewis, any of the admitted references, nor Schneider teach or suggest applying the recited cross validation method to electrolyte solutions containing physically and chemically interacting constituents of different chemical natures present at concentration levels that differ by several orders of magnitude. Therefore, the references in combination do not teach or suggest each and every element of claims 50-52. The references also fail to provide motivation to combine and modify teachings to arrive at the claimed chemometric method with a reasonable expectation of success. Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. § 103(a) rejection and allowance of claims 50-52.

#### **V. Conclusion**

In view of the forgoing remarks, pending claims 1-3, 16-17, 19-24, 27-44 and 48-55 should now be in condition for allowance, and an indication to that effect from the Examiner is respectfully requested.

#### **NOTICE OF APPEAL**

Applicant hereby appeals to the Board of Patent Appeals and Interferences from the Final Rejection dated July 13, 2006.

#### **EXTENSION OF TIME PETITION**

Applicant hereby petitions for a one month extension of time for the filing of this response. The three-month response deadline was October 13, 2006, and the extended deadline is thus November 13, 2006.

Final Rejection Response  
U.S.S.N. 10/621,247  
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**FEE AUTHORIZATION**

Please charge all fees due in connection with this filing to our Deposit Account –  
No. 19-0733.

Respectfully submitted,

/Ernest V. Linek/

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